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(54) Transmitting base station operating statistics to a network management centre

(57) The present invention relates to a system in which base stations of a radio communication system generate statistical information relating to, for example, traffic levels, communication errors and the like and transmit it to a network management centre. Disclosed are a communication method, and system operable according to that method, for exchanging data within a radio communication system having a base station controller for controlling a plurality of base stations, a base station manager for managing a plurality of base station controllers, and a network management centre connected to a plurality of base station managers, wherein data is gathered in at least one of a plurality of formats (TSCS, NMS, TNM) and a process (NIH) is generated for handling data in one of the formats. The NMC is then notified as to the type of process generated and at the same time a subprocess (321, 322, 323) is generated for transmitting data in said one format to the NMC. The different data types may relate to real-time 315, hourly 318 and alarm/fault status 319 data.

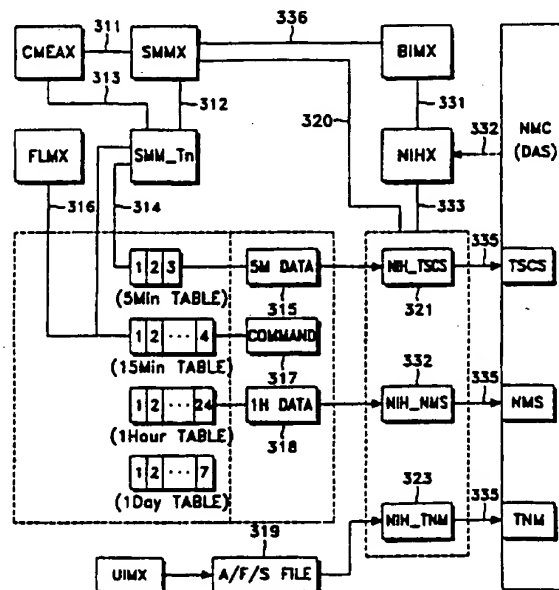


FIG. 3

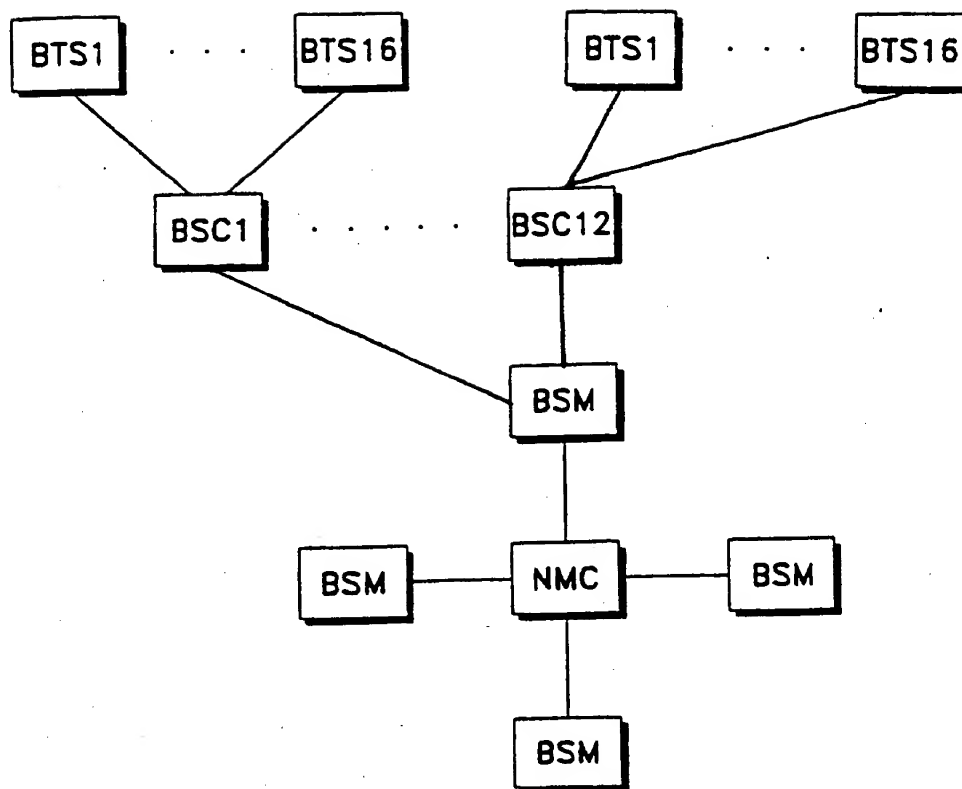


FIG. 1

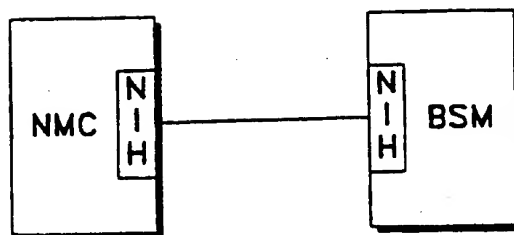


FIG. 2

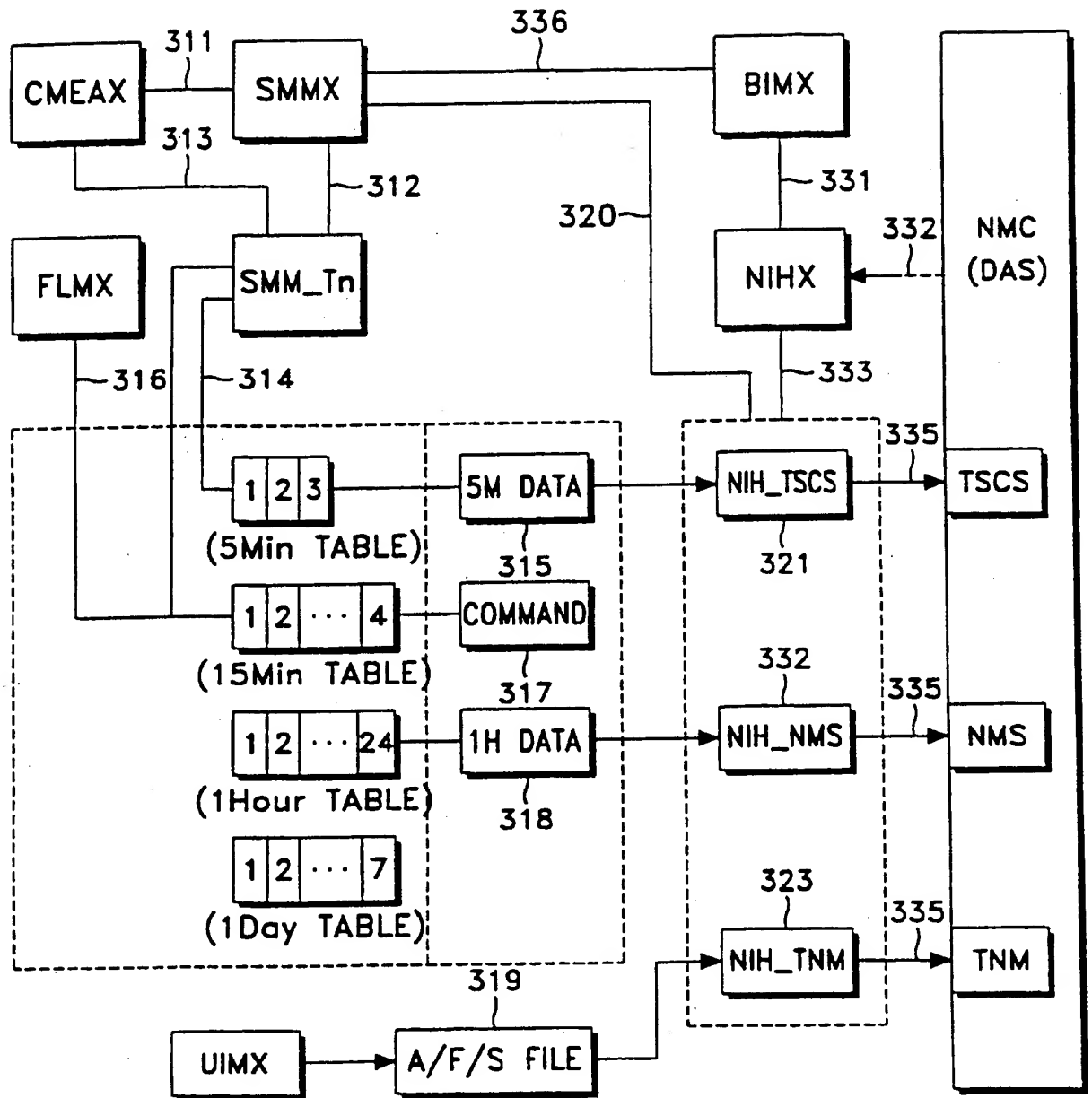


FIG. 3

COMMUNICATION SYSTEM AND METHOD

The present invention relates to a communication system and method of intensively managing a plurality of base station systems and various forms of data generated by said base station systems.

Generally speaking, a radio communications system is formed in cellular mode, in which base stations are installed in units of predetermined cells. The base stations are each capable of radio communication with mobile stations located in a corresponding cell area. It is assumed in this invention that the radio communications system uses code division multiple access (CDMA) mode. In the CDMA mode a plurality of base station transceiver subsystems (BTS) are installed in units of cells, and various states of the base station modules and various forms of data generated therefrom are required to be managed carefully. In order to realise such careful management, a remotely located network management centre is used.

Advantageously, the present invention allows the transmission of various pieces of information by connecting a base station manager (BSM) for managing base station transceiver systems and a network management centre in a radio communications system.

Accordingly, the present invention provides a method of exchanging data within a radio communication system having a base station controller for controlling a plurality of base stations, a base station manager for managing a plurality of base station controllers, and a network management centre connected to a plurality of base station managers, the method comprising the steps of:

gathering data required by the network management centre according to at least one of a plurality of data formats (TSCS, NMS, TNM),

generating a process (NIH) for handling data in said one format,

notifying the network management centre of identification information of the process (NIH),

generating, in response to the identification information of the process (NIH), a subprocess (321, 322, 5 323) for transmitting data in said one format and transmitting data to the network management centre according to said one format.

A second aspect of the present invention provides a system
10 for exchanging data within a radio communication system having a base station controller for controlling a plurality of base stations, a base station manager for managing a plurality of base station controllers, and a network management centre connected to a plurality of base
15 station managers, the system comprising

means for gathering data required by the network management centre according to at least one of a plurality of data formats (TSCS, NMS, TNM),

means for generating a process (NIH) for handling data
20 in said one format,

means for notifying the network management centre of identification information of the process (NIH),

means for generating, in response to the identification information of the process (NIH), a
25 subprocess (321, 322, 323) for transmitting data in said one format and transmitting data to the network management centre according to said one format.

An embodiment of the present invention will now be
30 described, by way of example only, with reference to the accompanying drawings in which:

FIG. 1 shows the configuration of a cellular communication system of an embodiment

FIG. 2 shows the connection between the network
35 management centre and a base station manager; and

FIG. 3 is a flow chart which shows the signal processing operation between a base station manager and the network management centre.

Referring to FIG. 1, a base station transceiver subsystem (BTS) performs a function of transmitting a radio signal. A BTS controller (BSC) is a device for controlling the BTS, one BSC controlling 16 BTSs. BSM (base station manager) is a device for controlling the BSC, one BSM controls 12 BSCs. A network management centre (NMC) is connected to the BSMs to manage remotely the base stations remotely.

The NMC is connected to a plurality of BSMs via cables. Referring to FIG. 2, there is shown the NMC and a BSM connected via a network interface handler (NIH). The NMC and BSMs are formed in a local area network (LAN), in which the communications mode is SOCKET.

Referring to FIG. 3, the NIH block has a function of transmitting control/trouble status data generated by the BSM, to the NMC. The data are processed accordingly to the category thereof. The categories of data are real-time traffic data (five-minute period statistics), one-hour period control data, and trouble/status data.

The abbreviations used in the description of FIG. 3 are listed below.

	NIH:	network interface handler
25	CMEAX:	call control processor measurement management
	SMMX:	statistic measurement manager
	BIMX:	BSM initialization & maintenance
	FLMX:	fault manager
	NMC:	network management centre
30	UIMX:	user interface manager
	A/F/S file:	alarm/fault/status file

The statistics related data provided by a SMMX, a statistic processing block, are accepted by the NIH and transmitted to the network management centre. The trouble/status related data, stored in a history file by the system message processing block of the UIMX by jobs and time, are read in real time and then transmitted to the network management centre.

The NIH block, spawned by the BIMX, is created by a parent process for spawning a child process after receiving a connect message (332) from the NMC, the client, and three child processes (321, 322, 323) for communicating with the NMC by message types. The parent process of the NIH normally waits for the connect message, the child processes maintaining the connection status until the close message is received.

10 According to the operation of the present invention referring to FIGS. 1, 2 and 3, the CMEAX initialises the BSM for reporting CCP (call control processor) statistics data in predetermined periods (5 or 15 minutes) 311) by spawning a SMMX.

15 The SMMX generates a child process for gathering CCP statistic data 312. The IPC is carried out between the CMEAX and the SMMX so as to gather the statistics data 313. The SMM_Tn separately stores and manages the real-time traffic data and the 15-minute period statistics data in periods of 5 minutes 314, and produces a 5-minute real-time traffic data file. The 5-minute data are data to be transmitted to the TSCS of the NMC. This file is overwritten when new data are collected 315. The FLM library accesses the trouble data stores in the 15-minute table according to the time 316. A 15-minute period statistics data file is produced only when a statistics command has been registered 317. The one-hour period statistics data file is generated and transmitted to the NMC of the NMC. This file is overwritten hourly when new data has been gathered 318. The system message processing function block of the UIMX writes alarm, fault, status data into a history file according to jobs and time 319. The SMMX informs the NIH when the file for comprising the 5-minute real-time traffic data and one-hour period statistic data is ready for transmission to the NMC. The SMMX permanent process transmits a data or signals to a corresponding process within the NMC.

In this case the corresponding process's ID must be transmitted, once spawned, to the NMC according to a NIHX's control process. If the SMMX permanent process is reset, NIHX should be able to report process ID of TSCS and NMS to the BIMX via the SMMX 320. The NIHX controls the NIH, and receives the signal via the SMMX to transmit the 5-minute period real-time traffic data to the NMC. Then, the NIHX reads the 5-minute period real-time traffic data file, which is transmitted to the TSCS 321. After receiving the signal via the SMMX for transmission of the one-hour period statistic data transmission to the NMC, one-hour period statistic data file is read and transmitted to the NMS 322. The system messages (alarm, fault, status) are read from the history file 319, and then transmitted to the TNM. Preferably they should be read continuously in real time 323.

The BIMX spawns a daemon process for socket communication. The daemon process assumes a waiting mode for receiving the connect message required for link set-up from the NMC. After receiving the connect message, a child process ID in accordance with the spawning of the child process is reported to the BIMX 331. The NMC, the client, transmits the connect message using a logic port ID (temporary port ID:300x). The Internet Protocol address and host name must be defined in advance [/etc/hosts] 332. The child processes are spawned to facilitate communication 333. Each child process is arranged to handle a corresponding one of a plurality of message formats or data types (TSCS, NMS, TNM). The statistic TSCS, NMS processes indicate their own process ID to the SMMX permanent process 334. The TNM transmits data to the network management centre in real time. The TSCS and NMS processes transmit their data in response to a signal 320 from SMMX. If the SMMX permanent process is reset, the BIMX passes the TSCS and NMS processes' PID to be used for the transmission of the No. 320 signal 336.

In short, the NMC requests from the NIHX various types of

data. Here, the data include 5-minute data, one-hour data, and A/F/S data. Then, the NIHX produces a corresponding process which drives the NIH. The NIHX reports the process ID generated to the BIMX. The BIMX outputs the
5 corresponding process ID to the SMMX. The SMMX spawns a corresponding SMM subprocess to transmit appropriate data to the NIH. The data transmitted from the NIH is sent to the NMC. Remote data input as above is intensively managed to control the operational status of base stations.

10

As described above, the present invention efficiently performs operation and maintenance of radio communications system by transmitting all kinds of data for system management and operation including statistic, status and
15 trouble data of the remote base stations to the NMC, and allowing the NMC to intensively manage the information transmitted.

CLAIMS:

1. A method of exchanging data within a radio communication system having a base station controller for controlling a plurality of base stations, a base station manager for managing a plurality of base station controllers, and a network management centre connected to a plurality of base station managers, the method comprising the steps of:
 - 10 gathering data required by the network management centre according to at least one of a plurality of data formats (TSCS, NMS, TNM),
 - generating a process (NIH) for handling data in said one format,
 - 15 notifying the network management centre of identification information of the process (NIH),
 - generating, in response to the identification information of the process (NIH), a subprocess (321, 322, 323) for transmitting data in said one format and
 - 20 transmitting data to the network management centre according to said one format.

2. A system for exchanging data within a radio communication system having a base station controller for controlling a plurality of base stations, a base station manager for managing a plurality of base station controllers, and a network management centre connected to a plurality of base station managers, the system comprising
 - 25 means for gathering data required by the network management centre according to at least one of a plurality of data formats (TSCS, NMS, TNM),
 - means for generating a process (NIH) for handling data in said one format,
 - means for notifying the network management centre of
 - 35 identification information of the process (NIH),
 - means for generating, in response to the identification information of the process (NIH), a subprocess (321, 322, 323) for transmitting data in said one format and transmitting data to the network management

centre according to said one format.

3. A method of exchanging data as substantially as described herein with reference to and/or as illustrated in
5 the accompanying drawings.

4. A system exchanging data as substantially as described herein with reference to and/or as illustrated in the accompanying drawings.



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Claims searched: 1 to 4

Examiner: Jared Stokes
Date of search: 8 October 1997

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.O): H4L (LDSX, LFM)

Int CI (Ed.6): H04Q (3/00, 7/22, 7/34)

Other: On-Line - WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2 238 207 A (Motorola) See whole document	1 & 2
X	WO 94/03992 A1 (Pactel) See whole document	1 & 2

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.